

I N S E C T S I N R E L A T I O N
T O
N A T I O N A L D E F E N S E

Circular 15

ANTS, WASPS, AND OTHER INSECTS



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INSECTS IN RELATION
TO
NATIONAL DEFENSE

Circular 15 - Ants, Wasps, and Other Insects

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INTRODUCTION

Of this miscellaneous group of insects and related pests only the rat mite and the itch, or scab mite are known to be directly involved in the causation of disease; however, the great numbers and the voracious habits of some of the other arthropods discussed in this circular make them nuisances about army camps and to soldiers in the field, particularly in tropical countries and in the warmer regions of the temperate zones. The bites and stings of many ants, bees, wasps, scorpions, some caterpillars, and the black widow spider are painful and may even have serious effects; and certain forms may invade and contaminate -- sometimes even destroy -- food supplies. Some kinds of ants are destructive to clothing and others damage the rubber insulation of telephone lines.

Although spiders, scorpions, and centipedes are universally feared, no doubt because of their ability to kill insects by introducing a paralyzing venom with the bite, it is nevertheless true that of the thousands of species which are included in these groups, only a very few are actually dangerous to man. For example, the evil reputation of the tarantulas is widespread, but there seems to be little foundation for it.

ANTS OF IMPORTANCE

In the United States some small ants like the fire ants (Solenopsis spp.) and the large harvester ants (Pogonomyrmex spp.) are vicious stingers. The former are found mostly in the extreme South and the latter mainly in the West. Many of the larger biting ants (species of Formica and Camponotus) aggravate their bites by excreting formic acid into the wounds caused by their sharp jaws. This irritant is ejected from the end of the ant's abdomen. The American tropics swarm with biting and stinging ants. The sting of one (Paraponera clavata) is not only exceedingly painful but sometimes causes temporary paralysis, a swelling of the lymphatic glands, and accompanied by a fever. The large and aggressive bulldog ants of Australia (Myrmecia spp.) are noted for their vicious bites and stings.

The driver, or army ants, of Africa (Dorylus spp.) move in masses of hundreds of thousands, devouring every animal, large or small, in their path which cannot escape. The legionary ants (Eciton spp.) of the American tropics behave in a similar fashion. These fearsome creatures, however, are not an unmixed evil, for when they have passed through a dwelling it is cleared of all its vermin.

One of the worst pests throughout the southern part of the United States and in portions of California is the small, slender, brown Argentine ant (Iridomyrmex humilis) (fig. 1). This is essentially an urban rather



Fig. 1.--The Argentine ant; left, wingless female; right, worker.

than a rural species. When it becomes established, it occurs in countless numbers, infests buildings continuously except in freezing weather, is drawn to all kinds of foodstuffs, especially meats, sugar, cake and sweetened bread, and swarms everywhere. One sign of its presence, besides its unusual numbers, is the absence of native ants which it exterminates as it spreads. It is normally an outdoor nesting species.

The fire ant (Solenopsis xyloni) will gnaw holes in clothing of silk, wool, or cotton, and it, as well as some of the acrobatic ants (Crematogaster spp.) have been known to remove the rubber insulation from telephone or light wires, thus causing short circuits and fire hazards.

Breeding Places

A few ants, like the tiny red Pharaoh ant (Monomorium pharaonis) (fig. 2) and the

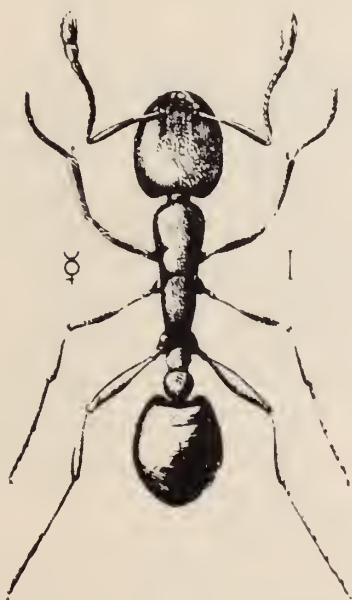


Fig. 2.--Pharaoh ant; worker

little black ant (M. minimum) breed indoors, beneath floors, in wall spaces, or in partially decayed wood, and usually only in old buildings; but most ants breed out-of-doors in nests in the ground or in rotting wood and invade buildings only to get food. The Pharaoh ant is essentially an indoor ant in the cooler parts of the temperate zones. It breeds the year round, is very prolific, occurs throughout the world, and is especially active and abundant where quantities of food are stored or handled. It often infests hospitals and warehouses.

The nests of some ants remain in the same locality for many years. Others are temporary affairs. Their size and depth in the soil vary greatly, depending upon the species involved. Some are shallow, scarcely penetrating the ground. Others may extend to a depth of from one or two feet to six or eight feet.

Control

Because of the diversified feeding and nesting habits of ants, it is necessary to know the species involved before intelligent control can be practiced. If there is any doubt about the identity of the species, either dead or live specimens should be placed in a vial containing 70 percent alcohol, the container carefully wrapped to prevent breakage or loss in transit, and sent to the Bureau of Entomology and Plant Quarantine, Washington, D. C. for identification. Any available information on the feeding habits, date and place of collection, and possible nesting places should accompany the specimens.

Preventive measures.--Since many infestations of ants, such as the Argentine ant, Pharaoh ant, and other species, are due to direct transportation by man in his food, building materials, or plants, these articles should always be carefully examined for ants before they reach their final destination. If ants are found, they should be destroyed with an oil spray similar to various fly sprays that are on the market. Cleanliness is an important item in ant control. Food containers should be kept closed, and shelves, tables, and floors clean. Garbage should be kept in tight containers and removed as quickly as possible.

Repellents and barriers.--Repellents are less desirable than baits or fumigants because they afford only temporary relief and have to be used frequently. The three most common repellents employed against ants are pyrethrum, sodium fluoride, and derris or cube. These are unsightly, and the sodium fluoride is poisonous; accordingly they are not ordinarily recommended except under the technical advice of an entomologist. Derris powder has, however, been found very effective in controlling several kinds of ants when dusted around the entrances to their nests in the ground, or in wood, and along their runways.

To keep ants off tables, refrigerators, or movable furniture, these articles should have no contact with other objects, and the legs of the furniture should be set in pans of oil or kerosene. The oil or kerosene should be changed frequently to prevent the ants from crossing on the dust film that often forms on the surface of the liquid. Sometimes ant tapes are used for this purpose. These are prepared by boiling cotton tape in a saturated solution of bichloride of mercury (corrosive sublimate), drying, and then tacking two or more windings of the treated tape securely around the legs of tables or other furniture so as to block the ants from crossing anywhere without contacting the tape. Caution: Bichloride of mercury is a dangerous poison and should be used with caution.

Fumigants.--When ant nests in the soil can be located and are accessible for treatment, a fumigant can be very effectively employed. Either of two common chemicals is used for such treatment; carbon disulphide or a solution made by dissolving one ounce of cyanide in a gallon of water. The chemicals can best be injected into the holes of a nest by the use of a funnel with or without a couple of feet of small rubber hosing attached. If the entrances to the ant nests are large, numerous, and well spaced, it

is not necessary to make holes for applying the chemicals, otherwise holes about an inch in diameter, two to three feet apart and one and one-half to three feet deep, should be driven into the nest. A pint of the cyanide solution or from one to two ounces of carbon disulphide, should then be injected into each hole. These should be closed as they are treated, and the entire surface of the ant nest wet thoroughly with water, which will form a blanket to prevent escape of gas. If the nest is shallow, the cyanide solution will probably be most effective; if deep, the carbon disulphide. Calcium cyanide dust may also be used. Caution: Cyanide is a violent poison in all forms whether solid, liquid, or gas. It should be used with great care and only by persons trained in its use. The carbon disulphide is about as inflammable as high test gasoline and must be handled with the same care. Shallow nests can be destroyed by spading up and saturating the soil and ants with oil diluted with kerosene.

Poisoned baits.--For ants that prefer sweets, a bait with a sugar sirup base should be used, and into this should be incorporated any one of the following poisons: Sodium arsenite, tartar emetic, thallium sulphate in accordance with one of the formulae given below.

Formula 1. - Dissolve 4 ounces of sugar in 1 quart of water and stir in one-half ounce of tartar emetic.

Formula 2. - Dissolve one-half pound of sugar in one pint of hot water and add one-seventh ounce (62.5 grains) of sodium arsenite: bring to a slow boil.

Formula 3. - (1) Mix 9 pounds of granulated sugar, 6 grams of crystallized tartaric acid, and 8.4 grams of benzoate of soda in 9 pints of water; boil the mixture slowly for 30 minutes and allow it to cool. (2) Dissolve 15 grams of sodium arsenite (C.P.) in one-half pint of hot water and allow it to cool. Add (2) to (1) and stir well, then add $1\frac{1}{4}$ pounds of strained honey and mix thoroughly.

Formula 4. - An excellent bait is prepared by mixing 1 pint of water, 1 pound of granulated sugar, 27 grains of thallium sulphate, and 3 ounces of honey. After mixing thoroughly, bring to a slow boil and allow to cool. Caution: Thallium sulphate is a dangerous poison and should be handled with special care. Do not breathe the vapors given off while the mixture is being heated. Ant baits containing thallium sulphate should be used only under the technical supervision of an entomologist.

Formula 5. - For ants that will not eat sweets but prefer grease and meat, work small quantities of tartar emetic into grease or pieces of bacon rind.

Formula 2 is recommended for most of the ants that eat sweets and especially for the Argentine ant. Fire ants can sometimes be effectively controlled with the thallium sulphate bait described in formula 4.

For distributing the poison baits, pill boxes lined with paraffin and provided with holes allowing the ants to enter, or metal cans (fig.3) may be employed. Holes may be made in the metal cans above the sirup line or the top may be indented on both sides with pliers. All containers should have tops to prevent evaporation of the poison or loss by rain.

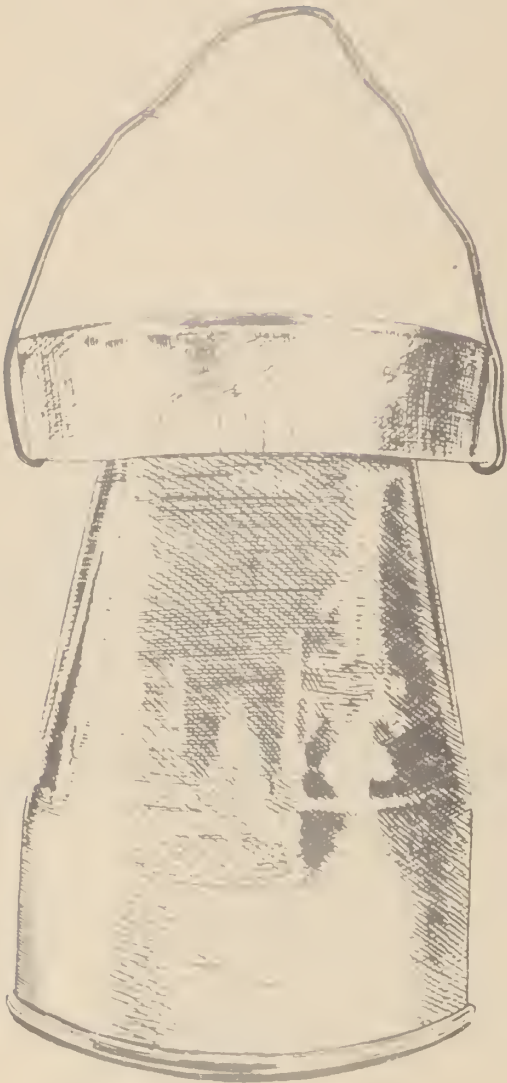


Fig. 3.--Tin can
container for ant
poison sirups.

If the ants are coming into the building from the outside, it is advisable to locate the containers of poison bait so that they will be interposed between the ant nests and the point of infestation in the buildings. If the ants are nesting in the house, the containers can be distributed wherever the ants are encountered. In order to lessen evaporation the containers should not be placed in the sun if this can be avoided. Some ants seem to shun the poison when it thickens as a result of evaporation.

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BEEES AND WASPS

On the basis of their habits bees and wasps divide into two distinct classes; (1) the solitary bees and wasps, which live alone and are shy and retiring, and (2) the social bees and wasps, such as the honeybees, bumblebees, hornets, and yellow jackets, which live in large communities and are very aggressive, particularly when their nests are disturbed.

Solitary Kinds

The solitary bees and wasps nest in a variety of situations. Many species are miners, constructing their nests in the ground; others are carpenters which tunnel in pithy stems or even in hardwood; some are masons and construct mud or clay nests; while still others utilize natural crevices or old nests of other species.

The solitary wasps most likely to cause trouble are the mason species which construct clay nests in and around habitations. These nests may be removed by scraping them from their supports. If the site of the nest is then sprayed with cresol or fly sprays, the return of the mother wasp will be prevented.

Certain solitary wasps comprising the family Mutillidae, or velvet ants, are parasitic on other bees and wasps, and have very painful stings. The adult females are wingless and ant-like in appearance, but are readily distinguished from true ants by being more robust and by the dense, rather long hair covering the body. Many of the species are conspicuously marked with red, yellow, or white hairs. Some of the Peruvian species, known locally as "isoula", have been reported to have such powerful stings that natives who have been stung have been incapacitated for a day or two. Inasmuch as the stinging females are usually found crawling on the ground, a stout pair of shoes is the best defense.

Social Kinds

The social bees include the true honeybees which have a world-wide distribution, the bumblebees which are most common in the north temperate regions, and the so-called stingless honeybees of the tropics. The social bees nearly always build their nests in sheltered situations such as cavities in trees, under the siding of houses, or in the ground.

The honeybees and some bumblebees are vicious stingers when their nests are molested. The stingless honeybees have a vestigial, non-functional sting, but some of the species will spread a caustic secretion on the skin which burns severely. The barbed sting of the honeybee and the poison glands attached to it are left behind in the wound. Care must be exercised in the removal of the sting lest additional venom be squeezed into the wound. The sting should be scraped out with the fingernail or knife blade.

The social wasps include the yellow jackets and hornets which occur in the north temperate and oriental regions, the paper wasps (Polistes and Vespa) which are world wide in distribution, and numerous kinds of tropical social wasps (Polybiinae). They build their nests of gray paper-like material in a variety of shapes and situations. Hornets construct the familiar ovoid nests which are usually suspended from eaves, tree branches, or in bushes. Yellow jackets build the same type of nest, but it is usually placed beneath the surface of the ground or behind the siding of houses.

Nearly all social wasps are aggressive when their nests are disturbed, and the danger arises from the fact that most nests have such a large number of adult inhabitants. One

Polybiine, Synoeca, a large steel-blue South American form, has a barbed sting which remains in the wound and the same precautions should be observed in the removal of the stings as for the honeybee. So far as known, the other social wasps do not lose their stings when using them.

Control

The control of social bees and wasps must be based on the type and accessibility of the nest and is best carried on at night when the adults have returned to the nest and are drowsy. In the case of exposed nests covered by an envelope (i.e., hornets and most Polybiinae) the nest openings should be plugged with a wad of cotton soaked with benzol or chloroform. After several minutes the nest is carefully removed from its support and placed in a closed container with additional anesthetic.

In the case of nests having an exposed comb with no envelope, the nest should be cut off and permitted to fall into a container which can be tightly closed, and which has in it a wad of cotton soaked with an anesthetic. The former site of the nest may then be sprayed with cresol or fly spray to discourage the return of and the reconstruction of nests by those wasps which have escaped. A fly spray may also be applied directly to the nest with a compressed air sprayer; if the nest is kept well enveloped in a fine mist or droplet spray, very few wasps will escape.

In the case of nests which are relatively inaccessible, such as those behind the siding of a house, the site should be closely observed to determine the location of all openings. At night these openings should be plugged with cotton or clay, the main opening being left until last and tightly plugged after a quantity of carbon tetrachloride has been poured into it.

Subterranean nests may be destroyed by pouring about a teacupful of carbon tetrachloride or carbon disulphide in the holes and covering with earth, wet sacks, or a stone.

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VENOMOUS CATERPILLARS

There are in this country a number of caterpillars that, upon being accidentally pressed against the skin, produce painful irritations due to the barbed hairs or spines on their bodies. In other instances, the hairs of molt skins left by hordes of caterpillars feeding on foliage may cause severe reactions, including skin eruption, irritated eyes, bronchial irritation, and coughing. The brown-tail moth Nygmia phaeorrhoea (Donov.), which occurs in the New England States, is one of the chief causes of this latter type of injury.

The irritation from loose hairs and from contact with the caterpillars is due to poison in the hair shafts which is secreted by the glands in the skin at the base of the hairs or spines.

Among the caterpillars that bear poisonous or nettling hairs are those of the nun moth, gypsy moth, io moth, and flannel moths. The flannel moths, Megalopyge crispata (Pack.) and puss caterpillars, M. opercularis (A. & S.) are probably the most important. The latter is a

very abundant species, especially in the South and Southwest, and the irritations produced are very severe. This and a number of related species are widely distributed in the tropics.

The puss caterpillars (fig. 4) are about an inch in length when full grown and the body is covered with long hair with a sort of a tail at the rear end. The color varies from pale grey through yellow shades to dark brown. The moths (fig. 5) are brownish in color and rather sluggish. The caterpillars feed upon various species of plants, particularly hackberry, elm trees, and rose bushes. When full grown, they seek protected places on tree trunks or elsewhere and spin elongate cocoons with a trap door (fig. 6) through which the moths escape. There are usually two or three generations a year and at least one is often greatly reduced in number by parasitic flies that attack the full-grown larvae.

Control

The most important step is to reduce the chance of irritations by destroying the caterpillars while they are feeding. To do this the trees and other food plants should be sprayed with calcium arsenate or lead arsenate at the rate (in powder form) of 3/4 pound of the former or one pound of the latter in 50 gallons of water. This treatment requires a power sprayer (see Circular 20 of this series) and is only applicable to more or less permanent camps. The cocoons, especially of the early generations, should be destroyed by scraping the trunks of infested trees.



Fig. 4.--Puss caterpillar,
slightly enlarged.



Fig. 5.--Moth of puss caterpillar
(slightly enlarged).



Fig. 6.--Cocoon of puss
caterpillar (about natural
size).

Treatment of Skin Irritations

Avoidance of caterpillars with poisonous or nettling hairs is most important. Local applications of a weak solution of ammonia or a moist pack of baking soda to the affected skin gives some relief. The use of a proprietary mixture known as campho-phenique has also been recommended. The following formula applied for an hour or two as a moist pack has been found beneficial.

| | | |
|---------------|-------|-----------|
| Carbolic acid | - - - | 1/2 gram |
| Zinc oxide | - - - | 1/2 ounce |
| Lime water | - - - | 8 ounces |

MITES

The Tropical Rat Mite

The blood-sucking mite of the rat, Liponyssus bacoti (Hirst), one of the mites most troublesome to man, often invades barracks, warehouses, stores and homes. When hungry, the mites crawl about freely during day and night in search of food. The scattering of the mites is often caused by the destruction of their normal hosts, the rats; however, mites are sometimes found in great numbers where rats are abundant and have not been disturbed. The nymphs and adults are very active and readily leave the nests of their natural hosts and travel freely for long distances. In many instances mites have been observed to drop from the infested ceiling of a room. They have been found also to pass from one floor of a building to another along pipes extending through the floor.

From observations in infested premises, it appears that the mites are not very long lived in any stage when no food is available. The greatest longevity noted was ten days, but it seems to be greater when the mites are allowed to remain in their natural environment in a building.

Character of attack on man.--Both the nymphs and adults attack man freely. All crawl rather actively and frequently, do much running about over the body, biting here and there. No particular region of the body is chosen by the mites to the exclusion of others, although they seem to prefer tender skin.

The bite is distinctly painful at the time the mouth parts are inserted. The duration of the irritation from the bite varies with the individual. The haemorrhagic spots at the point of attack seldom persist more than two days. There is also much variation among individuals as regards frequency of bites, their after effects, and the general annoyance produced by their presence. Some claim to have been made ill through the attack of many mites, and to have had some fever as well as a feeling of general discomfort. This condition appears not to be due to a specific disease organism; however, endemic typhus may be transmitted through the bites of this mite.

Control.--The control of the tropical rat mite appears to be essentially a problem of rat control. In the absence of warm-blooded animals, the mites perish after ten days or two weeks. Floors, cabinets, desks, files, and shelves should be sprayed with kerosene or a kerosene-pyrethrum spray to give relief. The mites hit by the spray are killed and the others are apparently repelled for a short time. A generous application of naphthalene flakes is also helpful in reducing the numbers of rat mites on floors, in attics, and storage spaces. In warehouses a more lasting effect can be had by spraying the floors with a fine mist of creosote oil. This material is caustic and will stain and it should therefore be used with care.

The Straw or Grain Mite*

The straw or grain mite, Pediculoides ventricosus (Newport), is a predaceous species which sometimes attacks man, although it ordinarily preys upon the larvae of insects. It is capable of producing a very disagreeable dermatitis commonly called "straw itch." Severe infestations are common in certain localities around flour mills and where infested straw is used in mattresses.

Control.--Finely divided sulfur is highly effective when brought in contact with these soft-bodied mites, and it may be applied with a common dust gun. Individuals who are exposed to infestations should derive some protection from the use of sulfur on their bodies and clothing. If the dermatitis occurs about food establishments, one would suspect "grocer's itch", and would fumigate the infested material or expose it to temperatures of 125°F. for three hours or longer.

The Clover Mite

The clover mite, Bryobia praetiosa (Koch), frequently invades habitations during the spring, but their invasions are usually of short duration. They enter buildings either when migrating from protective places about walls and foundations after hibernation in the adult stage, or as a result of the cutting of clover and other plants upon which they have been feeding. They do not attack man.

*For a discussion of harvest mites or chiggers (red bugs) see Circular No. 14 of this series.

Control.--If clover mites are found to be very abundant around the bases of barracks or other buildings, such places may be sprayed with nicotine-sulphate, 1 part to 200 parts of water, with a sufficient amount of soap to make the solution milky in appearance. The ordinary household sprays, which consist essentially of kerosene extract of pyrethrum are fairly effective for destroying mites which gain access to buildings.

The Itch or Scab Mite

The itch mite attacking man, Sarcoptes scabiei (Deg.), prefers the thin skin between the fingers, the under side of the knee and elbow, although they often infest other parts of the body as well. This species produces severe itching because of its toxic secretions and burrowing habits. These mites burrow in the epidermis and cause the formation of tiny vesicles and papules on the surface. The infestation may be spread by the scratching of these and other parts of the body and this scratching may induce secondary infection. Infestation is increased by direct contact such as hand shaking and by the use of infested clothing, bedding, and towels.

Control.--Before a remedy is applied, the skin should be softened by washing with green soap and hot water. The best formula known to us consists of 10 grams benzyl benzoate, 2 grams dinitroanisole, 1 gram 20% pyrethrum concentrate (0.2% pyrethrins), 0.5% IN-930, with sufficient 95% ethyl alcohol to make 100 cc. This formula has also been used as a control for head lice and found highly satisfactory. Sulfur ointments have given fairly good results when applied at intervals of 3 or 4 days, and colloidal sulfur soap has been found effective.

All clothing and bed linens which have come in contact with infested parts should be sterilized by steam, boiling water, or baking.

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SPIDERS

The Black Widow

This is really the only serious, poisonous spider within the United States, and although painful and acute systemic disturbances may result from its bite, very few authentic cases of death have been recorded. This spider is not aggressive, and it is often difficult to get it to bite for experimental purposes. The bite is inflicted by two stout jaws which work sidewise. The tip of each of these is provided with an incurved, needle-like tooth through which the poison is injected.

Distribution and habits.--The black widow spider is to be found in practically all parts of the country, although it is more prevalent in the Southern States than in the North. It seldom enters houses, but it frequents wood piles, garages, out-toilets, manholes, culverts, and similar places. It is also found under rocks, bridges, and hollow logs. It feeds normally on insects and other small creatures.

The web of this spider is loosely woven and irregular. Three hundred to four hundred eggs are laid at a time in a dense, whitish web ball, the size of a large pea. The eggs hatch in 3 to 4 weeks, and the young spiders scatter over the web. They are very cannibalistic, and probably many of the young are devoured before they reach maturity.

Appearance and size.--The female black widow spider is shining, metallic, blue-black on the upper surface of the body. On its under side it has one or more brick-red spots above the spinnerets near the tip of the abdomen and another red mark shaped like an hourglass. The abdomen is globose, having somewhat the appearance of a black shoe button. The young spiders and the adult males usually have yellowish markings on the upper side of the abdomen. Full-grown females may measure one-half inch from head to tip of abdomen, with a much longer reach of the legs and feet. The males are smaller and do not bite.

Control.--In localities where black widow spiders commonly occur, removal, from around barracks and other buildings, of materials which harbor spiders is recommended. Piles of brick, tile, wood, and old boards, are common breeding places for it. Creosote oil is recommended for killing this spider where it is likely to be found. Outdoor latrines, especially the under side of the seat, and rock piles should be treated if spiders are found. This is best done by applying the oil with a bucket pump or compressed air sprayer.

Men who are exposed to the attack of these spiders in the course of their work should wear leather gloves.

First-aid treatment for bites.--In case one is bitten, the making of an incision exactly through the bite or puncture with a safety razor blade or equally sharp instrument is suggested, the object being to induce free bleeding. The application of suction with the mouth or preferably a suction cup as in snake-bite treatment, is also recommended. Following this, a disinfectant should be applied. A doctor should be called without waiting for further developments.

House Spiders

A number of different species of spiders are found within living quarters of man, and sometimes they become so numerous as to cause annoyance and disgust. The young of the common house spider readily gain access to living quarters through screens or loose-fitting doors and windows. The close proximity to barracks of trash, old lumber, brick, and other debris, favors the breeding of spiders and increases the number which enter the habitations of man. The space under barracks is an admirable breeding place, and the treatment of such places is an important step in their control.

As a class, spiders are considered beneficial because they prey upon flies and other noxious insects. Few of them will bite; in fact, most of the spiders that frequent houses do not have jaws powerful enough to pierce the skin, nor are they provided with active poison glands.

Control.--Spiders in outbuildings and beneath barracks may be killed and their breeding in such places checked for some time by spraying with creosote oil. This material has an objectionable odor, and it stains paint and kills plant life; therefore, it must be used with caution. Careful screening of buildings, particularly basements, will do much to keep spiders out, and by keeping out flies and other insects which serve as food for spiders, the spiders are not encouraged to enter.

In most cases the webs can be brushed down, and the spiders crushed on the floor immediately, and the walls sprayed heavily with one of the standard fly sprays. Especial attention should be given to the crushing of the white egg cocoons which, if not destroyed, will soon give rise to large numbers of small spiders. Sometimes it is necessary to repeat this treatment at weekly intervals, as the spiders keep coming inside if they can do so. Wall-cleaning attachments on vacuum cleaners are useful in removing webs and in destroying the spiders.

Tarantulas

Certain tarantulas are of such great size that they attract attention and frequently they are greatly feared because of their formidable appearance. Those that live in the South and southwestern part of the United States are harmless, however, and frequently are captured as curiosities. They are nocturnal and usually come forth in the evening and lie in wait for their prey.

The American species of tarantulas are found usually under debris, loose stones, in decayed trees and logs, or in holes which they make in the ground. Some of the burrowing species dig tunnels, the openings of which can be closed by a lid.

Control.--They can be controlled by a general cleaning up of loose rubbish and the killing of individuals by crushing them under foot when encountered.

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SCORPIONS

There are a great number and variety of scorpions and most of them can be easily recognized by their more or less crab-like appearance. Another identifying characteristic is a long, slender, 5-segmented, tail-like postabdomen which terminates in a bulbous sac and a prominent stinging spine. After the young are born, they are carried about by the mother to whom they cling with their pincers.

Scorpions are common only in tropical and subtropical climates. They feed upon insects and spiders and remain hidden during the day beneath debris, lumber, stones, and under tent floors.

The sting of most scorpions is sharply painful, but, as a rule, its effects disappear in a short time without serious consequences.

One of the common scorpions of the southern United States is the common striped scorpion, Centruroides vittatus (Say). Although this scorpion is feared by many, it is harmless, and its bite is comparable to only a slight pin prick. The "whip scorpions", or vinegerones, as they are commonly called, occur in Florida and southern California. These species cannot sting but can bite. When handled, vinegerones

give off a repellent fluid which has the odor of vinegar. Some irritation by this fluid may be experienced by persons having a tender skin. The Durango scorpion, Centruroides suffusus Pocock, is a common species in the State of Durango, Mexico, and certain parts of Arizona. This species has the reputation of having caused over 1,500 deaths during a period of 36 years in Durango alone. The majority of fatalities, however, were children.

Control

Scorpions may be effectively reduced in numbers by a thorough cleaning up of hiding places such as loose boards, stones, bark, and other debris lying on damp ground. Creosote sprays have some repellent effect and can be used where the odor of creosote is not objectionable.

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CENTIPEDES

Centipedes are normally outdoor creatures that feed upon insects and other small animals. They do not injure plants or house furnishings; and were it not for their habit of coming into living quarters, centipedes would be of little concern to man.

Centipedes are feared by many because they look dangerous. They have poison glands in the claws of the first pair of leg-like appendages. The poison injected into insects and other tiny creatures when they are bitten by a centipede usually causes immediate death or paralysis.

Most centipedes throughout the North are comparatively small and rarely, if ever, enter habitations or bite man. In the Southern States, however, there are two species -- Scolopendra heros Girard and S. morsitans L. -- which can inflict a painful bite if they are pinched when a person puts on or handles clothing in the folds of which centipedes happen to be hiding. These species have 21 pairs of moderately long legs, and may become 4 to 6 inches long. Certain tropical centipedes are reputed to be very poisonous.

The house centipede, Scutigera forceps Raf., is capable of reproducing within barracks and living quarters, but this habit does not seem to be true of other centipedes in this country. This species has 15 pairs of long legs, and, in the female, the last pair is more than twice the length of the body, which when full grown is about an inch long. According to popular belief, the house centipede is poisonous, but it is doubtful if it ever deliberately bites man. The jaws are so weak that it is hard for them to penetrate the skin, and bites inflicted by them are few and the symptoms not severe. This centipede can run very rapidly and tries to get out of sight when disturbed.

Centipedes are generally considered beneficial, for, being carnivorous, they feed upon cockroaches, flies, moths, spiders, and other small creatures.

Control

There is no satisfactory control for centipedes. Sprays and powders are not practical, for usually they are not numerous and their location is not predictable. Debris and piles of rubbish should not be left beneath or about barracks raised on concrete posts or other blocks, for this encourages the increase of centipedes. In severely infested areas, it is well to examine and shake out clothing before wearing it in the morning. Barracks raised from the ground on piers may be given some protection by spraying the piers and the soil beneath the barracks with creosote oil. If bitten, ammonia or moist baking soda may be applied to relieve the pain, and this followed by a mild germicide as a protection against secondary infection.

MILLIPEDES

Millipedes are normally outdoor creatures. They are not carnivorous but feed upon decaying vegetable matter in damp soil and on decaying wood, and often eat the tender roots of plants and even green leaves that touch the ground. They are slow-crawling, dark-colored creatures with cylindrical, many-jointed bodies. If touched when crawling, they curl up. They have two pairs of very short legs on each body segment after the first three segments, which have only one pair each. Most of our native millipedes are less than one inch long but some tropical and subtropical forms attain a length of several inches.

The species Parajulus impressus Say, P. venustus Wood, and Spirobolus marginatus Say are common in the United States and most frequently annoying to man.

At certain times millipedes become restless for some reason, and then leave the soil and crawl into habitations, sometimes swarming over basements and first floors. They shun the sun, are most abundant on the shaded side of buildings, crawl during the evening, and hide during the daytime in the soil or beneath stones and boards or in other darkened and damp places. Dryness destroys them.

Millipedes do not bite man, do not harm furnishings, and do not eat sound wood.

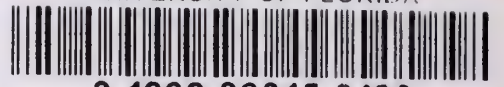
Control

When present in small numbers, millipedes can be controlled by placing slices of raw potatoes, apples, or turnips, lightly dusted with Paris green, where they can feed upon them. Creosote oil, sprayed on the outside of foundation walls and on the soil beneath is distasteful to millipedes. Scattering naphthalene flakes or paradichlorobenzene crystals about foundations and working them slightly into the soil aids in controlling millipedes, as does also liberal dusting with air-slacked lime. Liberal applications of kerosene-pyrethrum fly spray will help to control them when they are migrating from place to place in large numbers. Removing materials such as debris, boards, and brick from around barracks tends to prevent these creatures from accumulating.

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